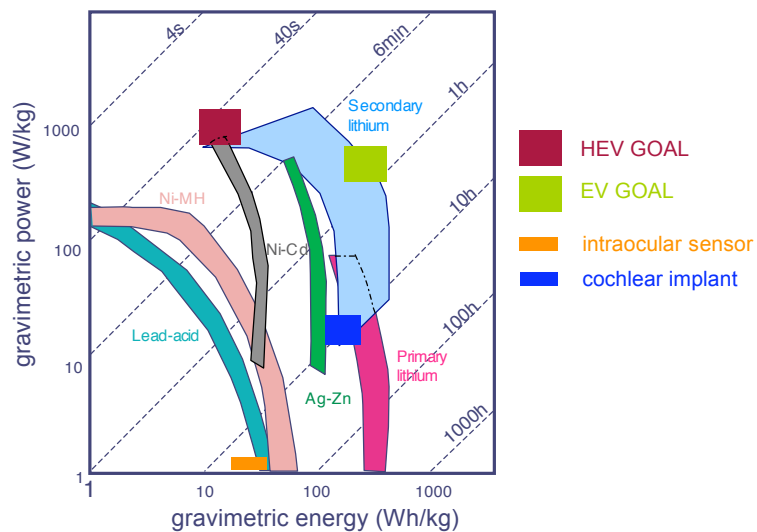


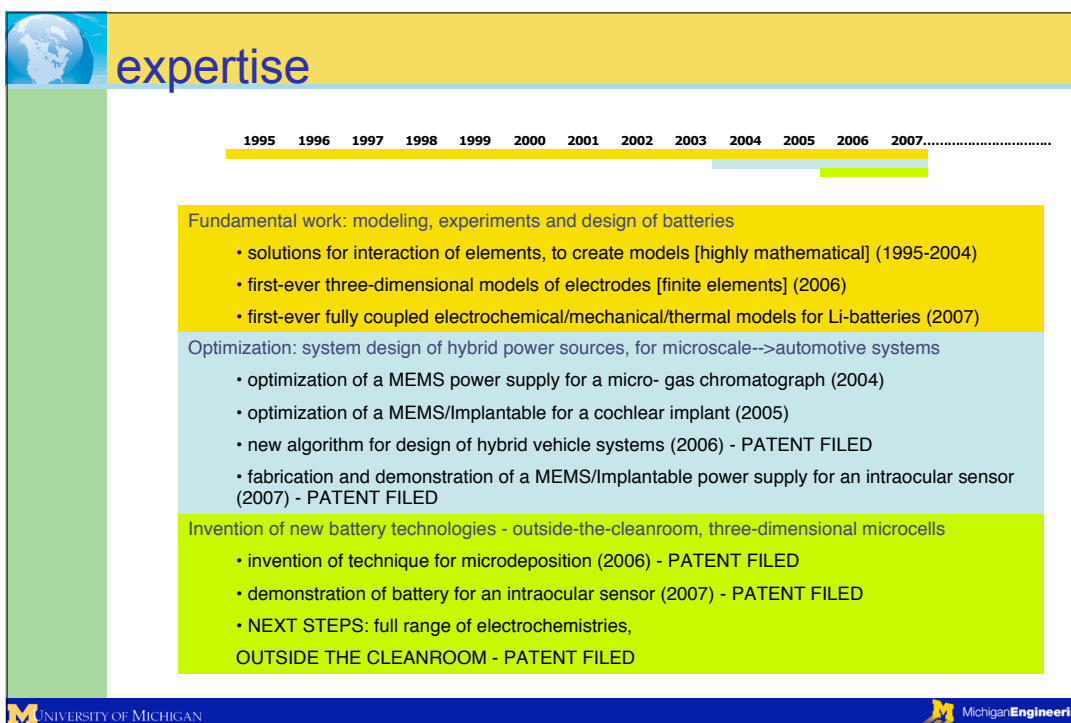
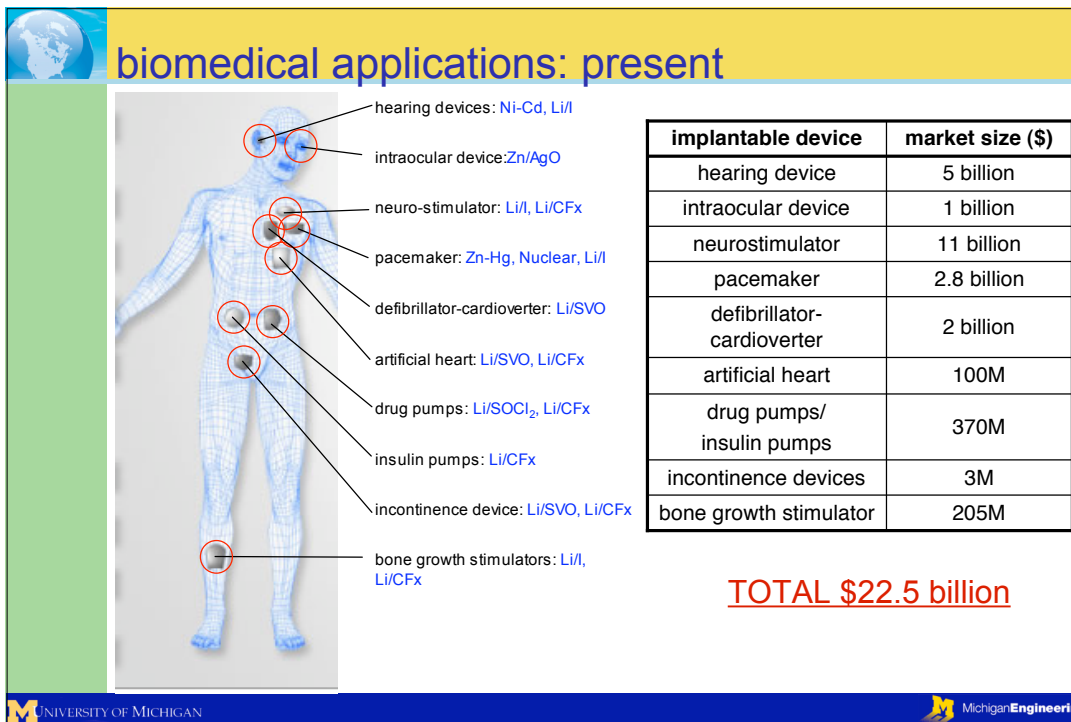


technical landscape



markets and technology evolution

market	market [SUSB]	2004			2007		
		electrochemistry	% of market	% of market, lithium	electrochemistry	% of market	% of market, lithium
automotive	15.4	Lead-Acid	98%	0%	Lead-Acid	94%	1%
		Ni-MH	2%		Ni-MH	5%	
		Total	100%		Li-ion	1%	
					Total	100%	
portable electronics	17.0	Alkaline	58%	18%	Alkaline	48%	40%
		Ni-MH	12%		Ni-MH	12%	
		Ni-Cd	12%		Li-ion	40%	
		Li-ion	18%		Total	100%	
		Total	100%				
medical	1.2	Lead-Acid	17%	34%	Lead-Acid	12%	49%
		Zn-Air	43%		Zn-Air	33%	
		Li	28%		Li	28%	
		Li-ion	6%		Li-ion	21%	
		Alkaline	5%		Alkaline	5%	
		Total	99%		Total	99%	





our technology

microdeposited battery: Ag/Zn

- MEMS compatible
- direct on-die processing capability
- outside the clean room (cost effective)
- smallest on-chip battery

microdeposition technique: materials demonstrated so far...
nickel (Ni), titanium (Ti), gold (Au), silver (Ag), zinc (Zn)

full-scale, 3D battery fabrication, outside the cleanroom -
design approach for Li batteries in progress



our technology: comparison

Secret sauce:

- Physical Vapor Deposition (PVD)
- Pulsed Laser Deposition (PLD)
- Nd:Yag laser machining

Attributes

- 3D electrode architectures
- solid or gel electrolytes

thin films: smart cards, implantable medical devices, microelectronics, wireless sensors, extreme temperatures (high/low)

market size: \$11 Billion

prismatic cells: medical devices, portable electronics

market size: \$7.5 Billion (US only)

microcells: emerging MEMS/implantable sensors and actuators

market size: \$4 Billion



talent pool: GROWING...

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President Emeritus and University Professor of Science
and Engineering
- Dr. Stephen R. Forrest, University of Michigan Vice
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Engineering and Computer Science, Materials Science
and Engineering, and Physics
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